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THE
ONTARIO WATER RESOURCES
COMMISSION
WATER POLLUTION SURVEY
of
SHARBOT LAKE

1968

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THE
ONTARIO WATER RESOURCES
COMMISSION

Report on a
WATER POLLUTION SURVEY

of
SHARBOT LAKE

District Engineers Branch
Division of Sanitary Engineering

1968

WATER POLLUTION SURVEY

of

SHARBOT LAKE

INDEX

PAGE NUMBER

Introduction	1.
General	1.
Investigations	2.
Sampling Procedures	2.
Sample Results	3.
Summary and Conclusions	3.

APPENDICES

1. Significance of Laboratory Analyses
2. Bacteriological Sample Results
3. Chemical Sample Results
4. Map of Sharbot Lake Showing Sampling Point Locations

WATER POLLUTION SURVEY

of

SHARBOT LAKE

INTRODUCTION

On July 18, 1968, an assessment was made of water quality conditions in Sharbot Lake. This investigation was prompted as a result of concern by a private cottage owner about water quality in the lake and possible sources of pollution.

Local officials interviewed at the time of the investigation included:

Mr. A.J. Lee, Clerk-Treasurer, Township of Oso;

Department of Lands and Forests, Representatives.

GENERAL

Sharbot Lake is located in the Townships of Oso and Olden approximately 45 miles north of the City of Kingston at the intersection of Highway 38 and Highway 7. This lake which is in the Hastings and Land O'Lakes vacation area attracts many tourists and cottagers during the summer months. Recreational activities including swimming, boating, camping and fishing are popular.

With the exception of the tourist industry there are no other industries on Sharbot Lake. The Community of Sharbot Lake is located on Highway 38 at the centre of the lake. This community is the main commercial and tourist centre in the area, and cottage development on the remainder of the lake is generally scattered. The Department of Lands and Forests maintain a camping area which borders on the west end of Sharbot Lake in the Black Lake area.

INVESTIGATIONS

The investigation was conducted by boat and in addition to interviewing a number of persons, it involved personal observations and the collection of water samples.

Observations did not reveal any instances of direct or indirect discharges of sewage to the lake, nor were any definite sources of water pollution reported by persons interviewed. Algae and other aquatic plant growths appeared to be limited to shallow, protected bay areas at the time of this inspection. It was assumed that the algae growth was due to natural causes and was not creating any particular problems in the lake.

It was suspected that laundry wastes from a tourist establishment located on McCrimmon Bay might be gaining access to the lake; however, this was not confirmed by water sample results. During the past spring increased turbidity in the lake near the Community of Sharbot Lake was reported as a result of road improvements to Highway 38 by the Department of Highways. The problem was investigated by the OWRC and the Department of Highways assured that measures would be taken to minimize silt pollution. At the time of this investigation no particular water pollution problems could be related to the highway improvements; however, a new man-made island was evident on the east side of the causeway just south of the community

SAMPLING PROCEDURES

Samples were collected for chemical analyses and bacteriological examinations. An attempt was made to collect samples from the lake near the major inlet and outlet streams and from

other pertinent locations, such as near the Community of Sharbot Lake. The locations of the sampling points are shown on the appended map.

The chemical samples were submitted to the OWRC Laboratories in Toronto, while the bacteriological samples were taken to the Department of Health, Regional Laboratory in Kingston.

SAMPLE RESULTS

An interpretation of laboratory analyses is appended (Appendix 1) to this report. The results of bacteriological examinations and chemical analyses are summarized in Appendix 2 and Appendix 3, respectively.

The sample results were within the OWRC surface water quality objectives for coliform organism content and Biochemical Oxygen Demand (BOD). Suspended solids and nitrogen levels were within favourable levels, and the absence of Anionic Detergents as ABS indicated that domestic wastes were not evident in the lake at the time of this investigation. The natural colour of the lake water was noted to be somewhat above the OWRC objective of five (5) units for this determination. This objective is based on consumer acceptability of the water for drinking purposes, rather than a pollution indicator.

SUMMARY AND CONCLUSIONS

On July 18, 1968, a special investigation was made by the Ontario Water Resources Commission to assess the water quality of Sharbot Lake.

Observations at the time of inspection and the laboratory results of samples collected did not reveal pollution of the water

in Sharbot Lake. The water was quite acceptable for bathing purposes in the areas sampled. With respect to use of the lake water for drinking purposes, raw water samples collected at the Sharbot Lake Water Works have, to date, only indicated a need for chlorination treatment of the water. However, it is a general policy of this Commission to recommend that filtration, in addition to chlorination, be considered in the development of water works where surface water supplies are utilized.

Suspicion that domestic wastes may be gaining access to the lake in some areas was not confirmed during the investigation. New subsurface disposal systems installed in this area, now require the approval of the Kingston, Frontenac and Lennox and Addington Health Unit. This health unit should also be contacted if problems develop with existing private disposal systems, in order that proper technical assistance can be provided when repairs are made.

It is anticipated that water pollution should not become a problem in Sharbot Lake provided that approved methods of sewage disposal are employed at all new and existing properties.

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APPENDIX 2

SHARBOT LAKE

BACTERIOLOGICAL SAMPLE RESULTS

Sampling Point Number

M.P.N.

Total Coliform Faecal Coliform
Organisms Organisms

1.	5	4
2.	0	0
3.	0	0
4.	10	10
5.	15	2
6.	0	0
7.	20	0
8.	0	0
9.	5	4
10.	0	0
11.	0	0
12.	5	2
13.	0	0

APPENDIX 3

SHARBOT LAKE

CHEMICAL SAMPLE RESULTS

JULY 18, 1963

Sample Point No.	B.O.D.	<u>S O L I D S</u>			<u>N I T R O G E N</u>				Anionic Detergents as ABS	Apparent Colour Units
		<u>Total</u>	<u>Suspended</u>	<u>Dissolved</u>	<u>Free Ammonia</u>	<u>Total Kjeldahl</u>	<u>Nitrite</u>	<u>Nitrate</u>		
1.	0.5	154	5	149	0.05	.36	0.003	0.01	0.0	20
2.	0.7	168	1	167	0.08	.44	0.003	0.01	0.0	40
3.	0.4	142	4	138	0.07	.42	0.003	0.01	0.0	20
4.	0.6	156	2	154	0.06	.30	0.004	0.01	0.0	
5.	0.3	162	1	161	0.03	.50	0.003	0.01	0.0	
6.	0.5	172	1	171	0.07	.56	0.004	0.01	0.0	
7.	0.4	156	2	154	0.09	.36	0.004	0.01	0.0	10

1. East of Highway 38
2. Hawley Bay
3. McCrimmon Bay
4. Doran Bay
5. At Fall River Outlet
6. Opposite Briggs Creek
7. West of Highway 38

APPENDIX 3

SHARBOT LAKE

CHEMICAL SAMPLE RESULTS

JULY 18, 1968

Sample Point No.	B.O.D.	<u>S O L I D S</u>			<u>N I T R O G E N A S N</u>				Anionic Detergents as ABS	Apparent Colour Units
		<u>Total</u>	<u>Suspended</u>	<u>Dissolved</u>	<u>Free Ammonia</u>	<u>Total Kjeldahl</u>	<u>Nitrite</u>	<u>Nitrate</u>		
8.	0.4	168	2	166	0.04	.36	0.004	0.01	0.0	25
9.	0.4	152	1	151	0.06	.28	0.004	0.01	0.0	25
10.	0.8	182	1	181	0.05	.36	0.004	0.01	0.0	20
11.	0.4	164	3	161	0.04	.32	0.003	0.01	0.0	25
12.	0.4	188	2	186	0.03	.38	0.003	0.01	0.0	25
13.	0.4	176	2	174	0.02	.36	0.003	0.01	0.0	25

8. Opposite Stones Creek
9. Opposite Sharbot Creek
10. Opposite White Lake Creek
11. North of Cheese Island
12. North of Maxwell Island
13. Opposite Sharbot Lake Village Dock

APPENDIX I

SIGNIFICANCE OF LABORATORY ANALYSES

Bacteriological Examination

The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. The objectives for surface water quality in Ontario is a maximum of 2400 organisms per 100 millilitres.

The OWRC Laboratories employ the Membrane Filter (MF) technique of examination to obtain a direct enumeration of coliform organisms. The Department of Health Laboratories use the Most Probable Member (MPN) enumeration and coliform counts are reported as Total Coliform Organisms (TC) and Faecal Coliform Organisms (FC).

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (PPM) and is an indicated of the amount of oxygen required for the stabilization of decomposable organic or chemical matter in water. The completion of the laboratory test required five days, under the controlled incubation temperature of 20° Centigrade.

The OWRC objective for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million, is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally

the most significant of the solids analyses with regard to surface water quality. The effects of suspended solids in water are reflected in difficulties associated with water purification, decomposition in streams and injury to the habitat of fish.

Nitrogen

Ammonia Nitrogen or sometimes called free ammonia is the insoluble product in the decomposition of nitrogenous organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03 ppm; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation of ammonia. The significance of nitrites, therefore, varies with their amount, sources, and relation to other constituents of the

sample, notably the relative magnitude of ammonia and nitrite present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in the water.

Nitrate Nitrogen

Nitrate is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentration may be used as a guide: low less than 0.1 ppm; moderate 0.1 to 1.0 ppm; high greater than 1.0 ppm.

Anionic Detergents as ABS

The presence of anionic detergents as ABS is an indication that domestic waste is present.

Phenols

The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed

20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

Iron

Water for domestic use should contain less than 0.3 parts per million of iron in order to avoid objectionable tastes, staining and sediment formation. Iron concentrations of not greater than 17 parts per million in waste discharges should permit adequate protection of surface waters.

APPENDIX

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are: 1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of thirty years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

As noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital

cost is required to retire a debt over a thirty-year period.

2. Interest

On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

To provide money for repairs and replacements, Section 40 of The Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALY-OWNED WORKS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new program allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40 year period.

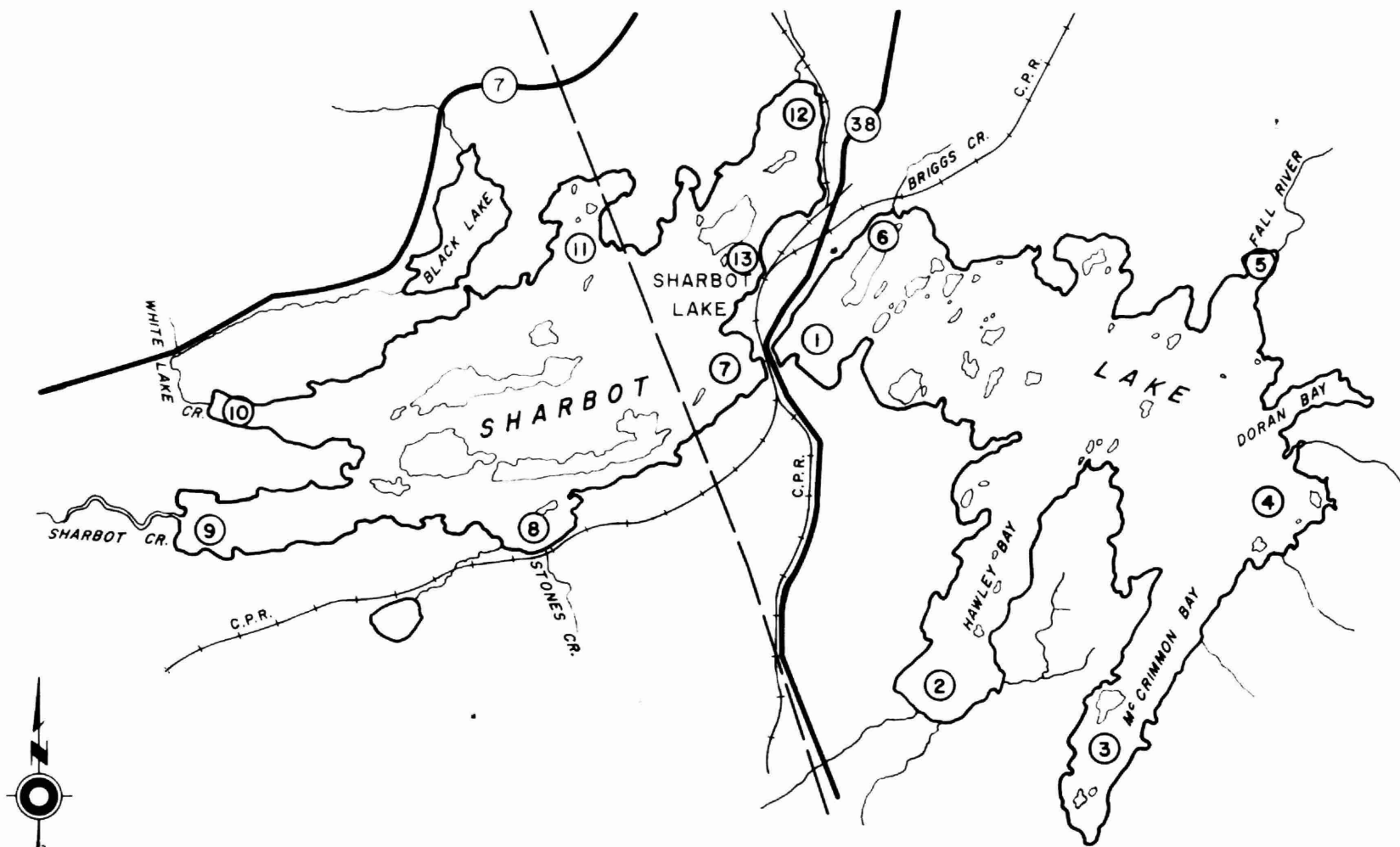
A slight variation of this program could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.



LEGEND
 ⑨ - SAMPLING POINT

ONTARIO WATER RESOURCES COMMISSION

SHARBOT LAKE

WATER POLLUTION SURVEY

SCALE: 1/2 0 1 MILES

DRAWN BY: A.R.S.

DATE: JULY, 1968

CHECKED BY:

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